4.4/25)

$$\ln\left(\frac{1}{x}\right)+\ln(2x^3)=\ln 3$$

$$\ln(2x^2)=\ln 3$$

$$\frac{2x^2}{2}=\frac{3}{2}$$

$$\sqrt{x^2}=\frac{\sqrt{3}}{\sqrt{2}}$$

$$x=\sqrt{\frac{3}{2}}$$

Oct 23-7:26 AM

$$e^{-2x} - 3e^{-x} = -2$$

$$u^{-2} - 3u^{-1} = -2$$
$$+2 \quad +2$$

$$u^2(u^{-2} - 3u^{-1} + 2) = 0(u^2)$$

$$2u^2 - 3u + 1 = 0$$

$$(2u-1)(u-1) = 0$$

$$2u - 1 = 0 \qquad u - 1 = 0$$

$$u = \frac{1}{2} \qquad u = 1$$

$$e^x = \frac{1}{2}$$
$$e^x = 1$$
$$\ln\frac{1}{2} = x$$
$$\ln 1 = x$$
$$\log_e 1 = x$$

A logarithm is an exponent

$$e^x = 1$$

$$x = 0$$

$$\ln\frac{1}{2} = x$$
$$\ln 1 - \ln 2 = x$$
$$-\ln 2 = x$$

$xe^{-x} + 2e^{-x} = 0$

$e^{-x}(x+2) = 0$

$\log_e 0 = -x$ $\quad x = -2$

$e^{-x} = 0$

$1/e^{x} = 0$ $\quad \cancel{1 = 0}$

$a(b+c) = ab + ac$

Oct 23-7:27 AM

$$\log_{10} x^{3/2} - \log_{10} \sqrt{x} = 5$$

$$\log_{10} \frac{x^{3/2}}{\sqrt{x}} = \log_{10} \frac{x^{\frac{3}{2}}}{x^{\frac{1}{2}}}$$

$$x^{\frac{3}{2} - \frac{1}{2}} = x^1$$

$$\log_{10} x = 5 \quad x =$$

$$10^5 = x$$

$\log_{10} x^2 + \log_{10} x = 30$

$\log_{10} x^3 = 30$

$10^{30} = x^3$

$\sqrt[3]{10^{30}} = x$

29)

$\frac{2e^{3x}}{2} = \frac{7}{2}$

$e^{3x} = 3.5$

$\frac{\ln 3.5}{3} = \frac{3x}{3}$

$\frac{\ln 3.5}{3} = x$

$$\log_{10}(1+x)=3$$

$$10^3 = 1+x$$

$$10^3-1 = x$$

14. $$\frac{1}{2}\log x - 3\log(\sin 2x)+2$$

$$\log x^{\frac{1}{2}} - \log(\sin 2x)^3 + 2$$

$$\log \frac{x^{\frac{1}{2}}}{(\sin 2x)^3} + 2$$

28)

$$\frac{3e^{-2x}}{3} = \frac{5}{3} \qquad e^{-2x} = \frac{5}{3}$$

$$\frac{\ln\frac{5}{3}}{-2} = \frac{-2x}{-2} \qquad x = \frac{\ln\frac{5}{3}}{-2}$$

Oct 24-8:30 AM

30)

$$e^x - 2xe^x = 0$$

$$e^x(1-2x) = 0$$

$$1-2x = 0$$

$$x = \frac{1}{2}$$

24)

$$\ln 4x - \ln(x^2)^3 = \ln 2$$

$$\ln \frac{4x}{x^6} = \ln 2$$

$$\frac{4\cancel{x}}{x^{\cancel{6}}} = 2 \rightarrow \frac{4}{x^5} = 2 \rightarrow \frac{2x^5}{2} = \frac{4}{2}$$

$$\sqrt[5]{x^5} = \sqrt[5]{2} \rightarrow x = \sqrt[5]{2}$$

4.3

$\frac{d}{dx}(x^n) = nx^{n-1}$

x is the base

x is the exponent

$\frac{d}{dx}(b^x) = b^x \cdot \ln b$

b: 2, 3, π, 10, . . .

e-specific

$\frac{d}{dx}(e^x) = e^x$

$e \approx 2.718281828\ldots$

$\frac{d}{dx}(\log_b x) = \frac{1}{x \ln b}$

b: 2, 3, π, 10, . .

$\frac{d}{dx}(\ln x) = \frac{1}{x}$

$\log_e$

chain rule versions. . . .

$\frac{d}{dx}(\ln f(x)) = \frac{1}{f(x)} \cdot f'(x)$